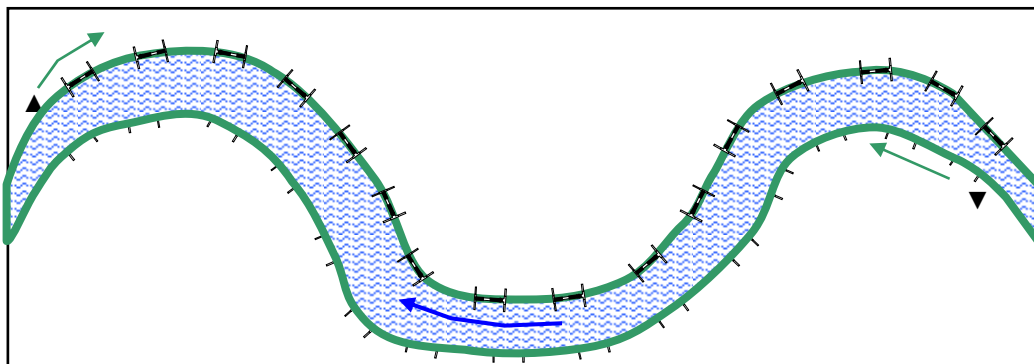**Figure 1**—placement of the monitoring frame along the greenline. Note that frame placement is not necessarily perpendicular to the placement on the opposite bank due to differences in greenline length.
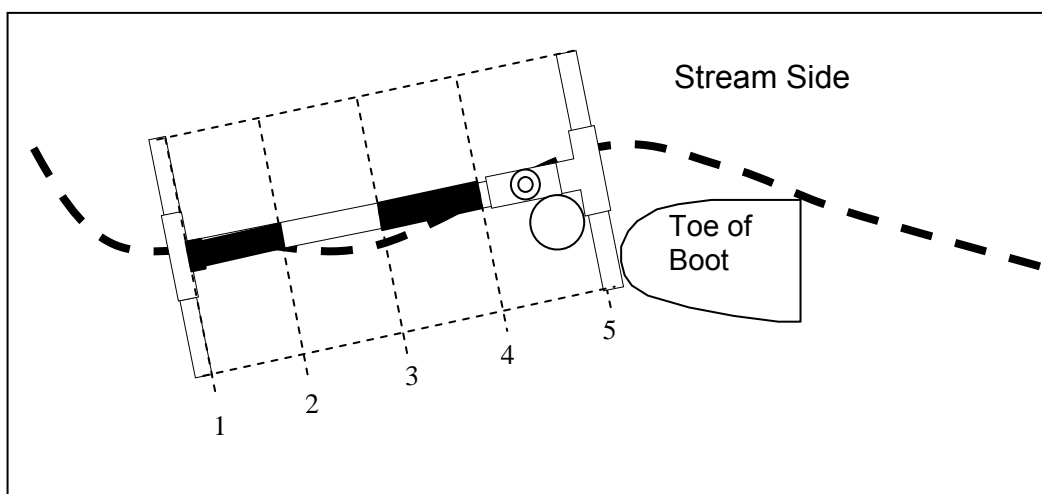

Figure 2—place the monitoring frame at the end of the toe with the center of the frame along the greenline. Complete monitoring in the following order to minimize movement of the quadrat: greenline vegetation, streambank alteration, streambank stability, stubble height, woody species regeneration, and woody species use. 1) Determine the dominant vegetation or community type that covers at least 25 percent of the frame. 2) Determine how many of the lines across the two quadrats intersect streambank disturbance caused by large herbivores, record 0 to 5. 3) Classify the stability of the streambank. 4) Measure the average height of the key species in the corner of the quadrat near the handle (A) or when there is no key species in the corner, select the plants within the 3 inch circle within the quadrat. When there are no key species are present within the quadrat, move to the next plot location. 5) Determine the number of woody species and age class within the 40 cm by 2 meter plot. And 6), document the use of the woody shrubs.
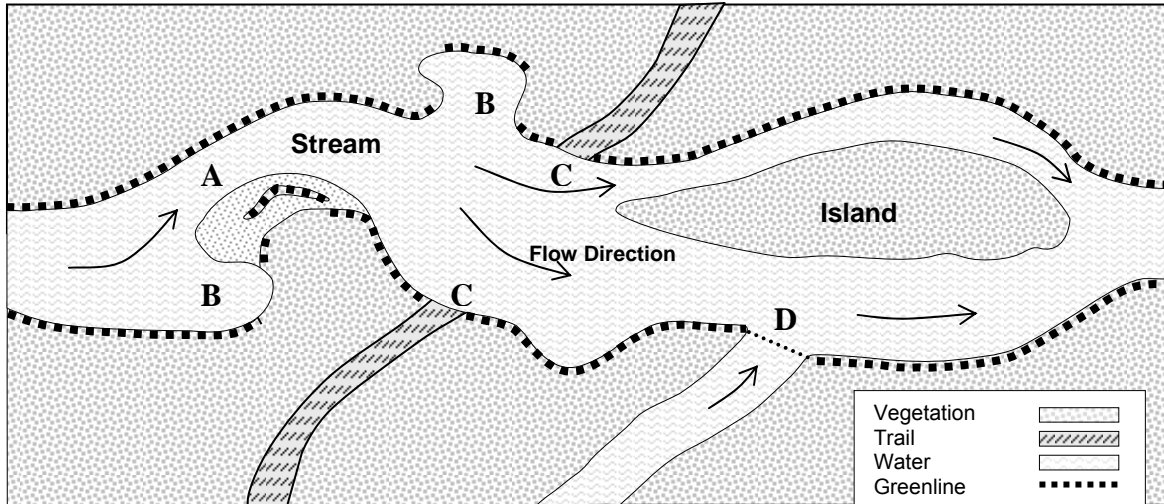
Figure 3—the point bar (A) shows a interrupted greenline with vegetation growing the bar not connected to the vegetation along the stream. The greenline runs more-or-less parallel to the flow of the stream. The areas shown by the letter "B" is an interrupted greenline as the vegetation exceeds 75 degrees toward perpendicular to the stream flow. The greenline continues when the line of vegetation begins toward paralleling the stream. Roads, trails (C), and tributary streams (D), are not considered part of the greenline. They may be record as information, but not included in greenline calculations. These include livestock and wildlife trail.
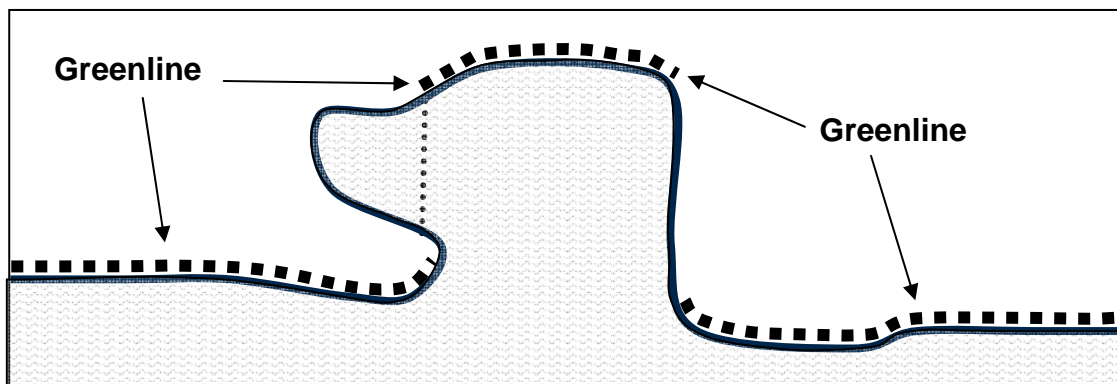

Figure 4—the greenline is on the streambank approximately parallel to the water flow. Streambanks perpendicular (over 75 degree angle) to the stream flow is not considered greenline.
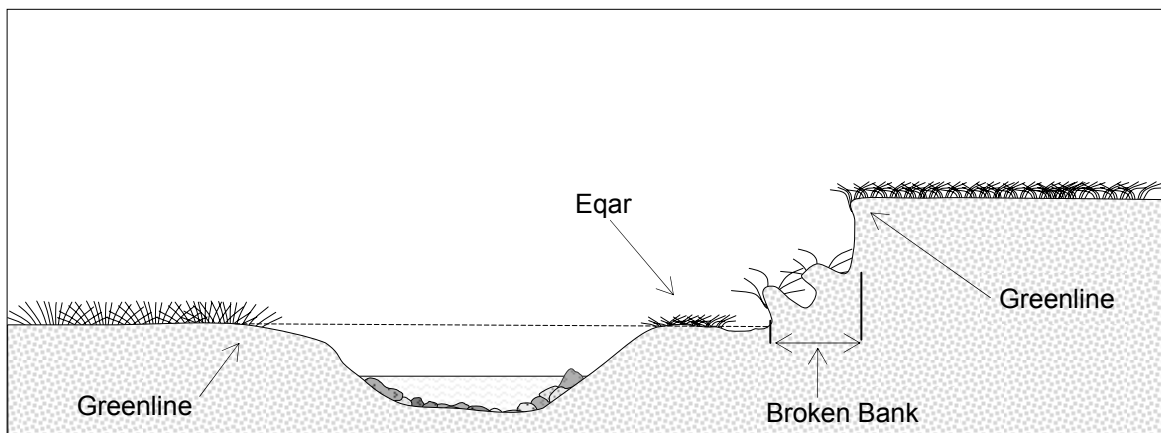
Figure 5—the diagram shows the location of the greenline in a situation with a broken bank. The field horsetail (Eqar) is shown on an area that is an island during above bankfull flows and therefore the greenline is on the edge of the higher bank (terrace). The greenline on the left-hand bank is typical of vegetation at or slightly above the bankfull flow line.
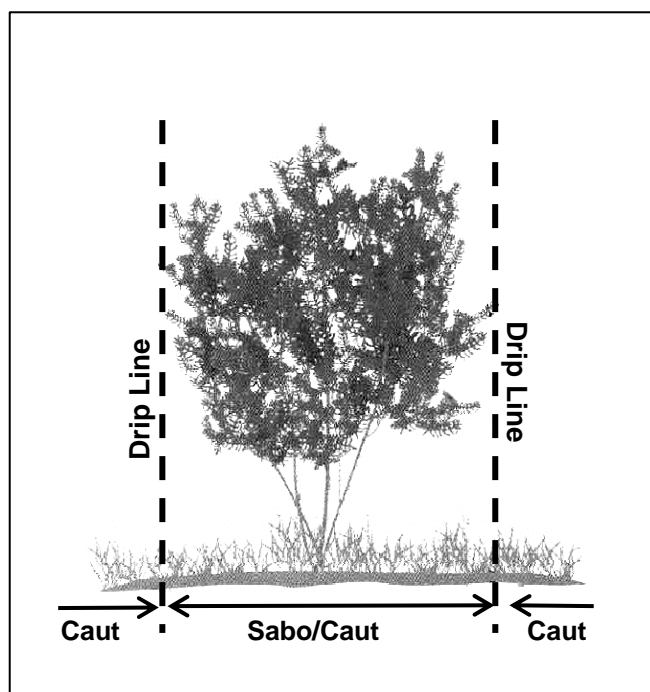
Figure 6—record overstory when the the drip-line of a shrub or tree covers 25 percent or more of the quadrat. The overstory species is always listed first in the vegetation community symbol. (Winword 2000)
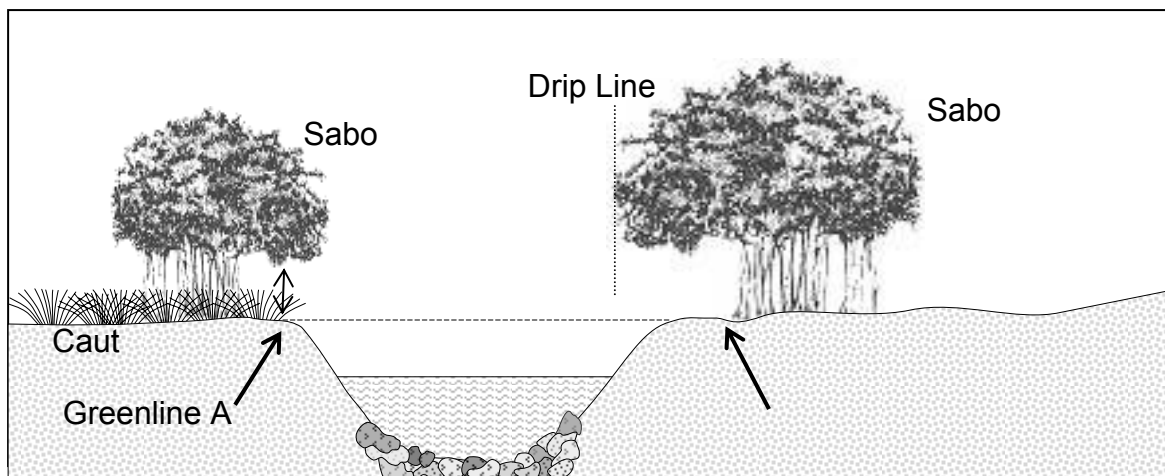
Figure 7—greenline A is an example of a shrub Booth's willow (Sabo) overstory with beaked sedge (Caut) as an understory. The type name would be Sabo/Caut. Greenline B is an example of the location of the greenline when there is a shrub overstory and no vegetation understory, the greenline is at the base of the shrub or tree.
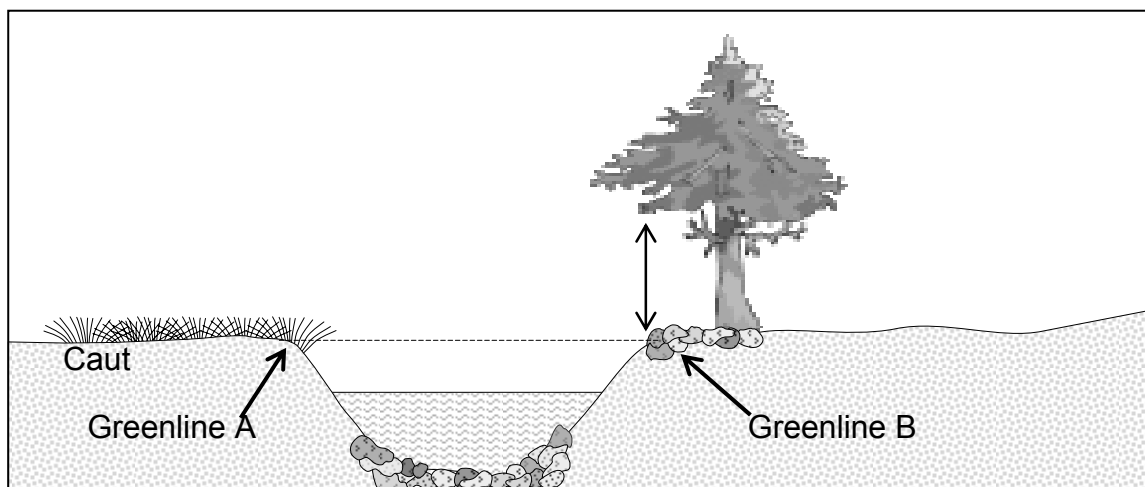
Figure 8—greenline A is an example of a single species, beaked sedge (Caut). Greenline B is an example of the location of the greenline when there is a conifer tree overstory with anchored rock in the streambank.   Conifer would be the dominance type with achored rock as a co-dominant.

APPENDIX D—Modified Daubenmire Monitoring Frame

Monitoring frames may be constructed of various materials ½-inch PVC schedule 40 plastic pipe or metal. Schedule 40 PVC is rigid and does not warp as much as the lighter pipe. This material is inexpensive, light, and easy to use to make the frames. Carefully measure each of the products before they are glued together as fittings, i.e., tees and elbows, are not uniform between manufacturers. When handles or other components that are not glued and will not stay in the fitting, the frame can be modified by gluing male and female threaded fittings which allow the parts to be threaded together and still can be taken apart for storage or transportation. Electrical tape wrapped around the pipe is a good material for marking the alternating colors. It does not come off the pipe as easily as paint.

Metal frequency plot frames (typically 40 by 40 cm) may be used by extending the tines to 50 cm in length and marking the four incremental segments with lines or alternating colors.
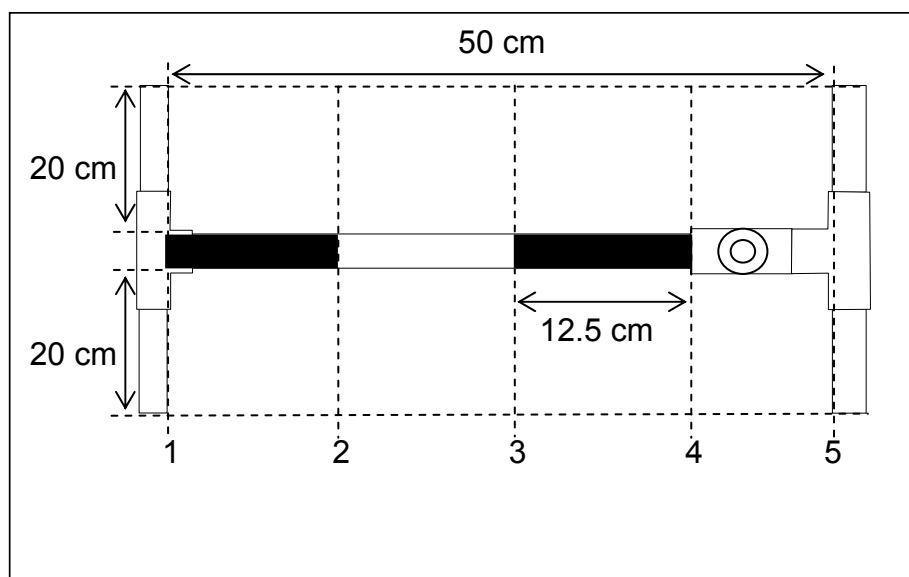
Figure 1—Multi-indicator monitoring quadrat. Based on field experience, this is the preferred quadrat configuration. It is light, easy to carry, and manipulate in shrub type vegetation. Observers must be careful to extend the lines to complete the quadrat. Components consist of three ½ inch PVC plastic tees, four pieces of ½ inch PVC pipe 19.7 cm (7 ¾ inches) long, one 43 cm (16 15/16 inches) long, one piece of pipe 3.2cm (1¼ inches) long, and one 3 foot piece for a handle. The handle may be a convenient length. Mark one inch increments on the handle to facilitate stubble height measurements. Wrapping the long pipe with electrical tape is a good way to mark the segments. It is easy to apply and outlasts paint.

Material list to make a monitoring quadrat from ½ inch Schedule 40 PVC pipe

Item	Number	Length	
		Inches	**Centimeters**
½ inch Tee	3	-	-
PVC pipe	4	7.75	19.7
PVC pipe	1	16 .9	43
PVC pipe	1	1.5	3.8
PVC pipe (handle)	1	39	100

APPENDIX D—Modified Daubenmire Monitoring Frame
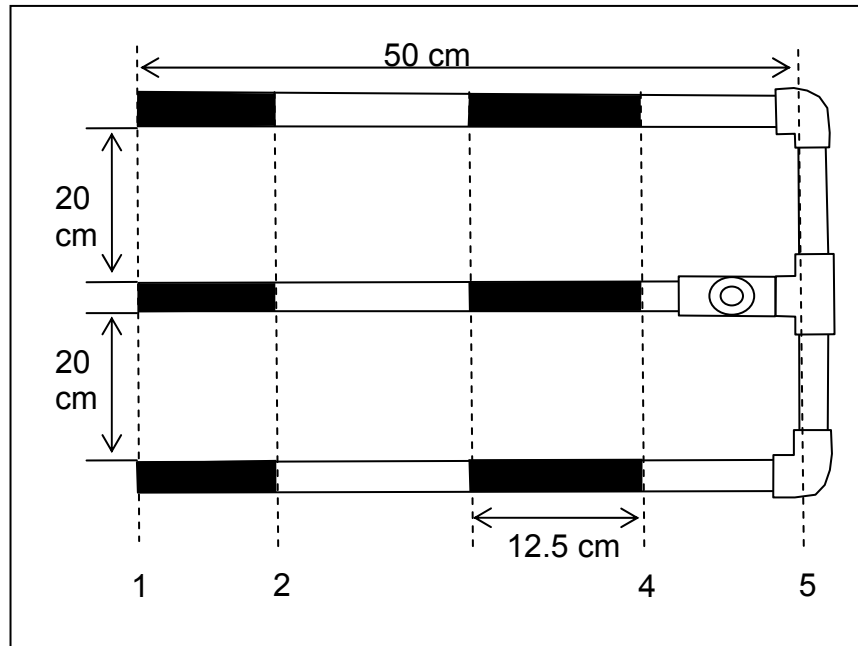
Figure 2—Multi-indicator monitoring quadrat. This configuration more succinctly defines each of the two plots. It is easy to use in non-shrubby environments. The frame consists of two 20 cm by 50 cm Daubenmire monitoring quadrats set side-by-side. The frame may be constructed of any suitable material. One half inch Schedule 40 PVC is an inexpensive material that is quite rugged.

Material list to make a monitoring quadrat from ½ inch Schedule 40 PVC pipe

Item	Number	Length	
		Inches	**Centimeters**
½ inch tee	2	-	-
½ inch elbow	2	-	-
PVC pipe	3	19.6	49.7
PVC pipe	2	7.6	19.4
PVC pipe	1	1.5	3.8
PVC pipe (handle)	1	39	100
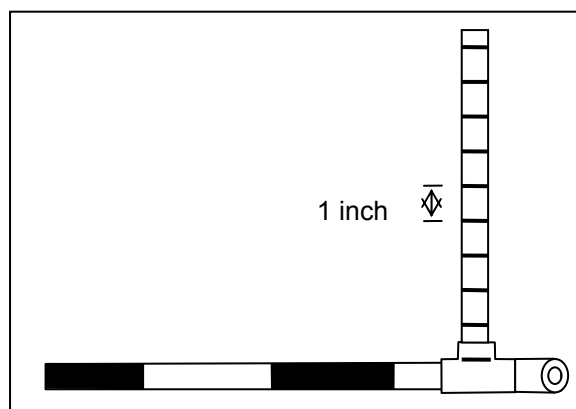
Figure 3—Mark the handle in one inch increments to facilitate measuring stubble Height.

APPENDIX E -- Digital Data Entry

A data entry form has been prepared for use with PDA's using the Excel spreadsheet format. The form can be downloaded into Excel on the users PC, and then converted to Pocket Excel in the PDA through synchronization. This file includes user instructions. Calculations and analyses are limited in this form to avoid time delays caused by the much reduced processing speed of handheld computers (see Appendix M).

Using Pocket EXCEL for PDAs & the Data Entry Module

Use Pocket EXCEL to enter data in the field and determine sample size needed.

The Data Entry Module is designed to be used with Pocket EXCEL.

Enter data for one pasture in an allotment, on one File. Save the file as the pasture or DMA name.

Entering data

Header

The "Header" worksheet records descriptive info and is required.

You can generate a random # in the "Header" worksheet entering the formula "=RAND()*10," followed by enter.

You should also indicate how many steps you take in a pace, and length of your step in meters.

Gradient is stream gradient in %. You should also enter the substrate class using the codes in the "Codes" spreadsheet.

The questions concerning woody plants must be answered to obtain a seral status rating.

DMA

Copy plant codes from the vegetation worksheets using "copy" and "paste" function on the PDA.

Data entry cells are non-colored

Codes

This worksheet describes the bank stability and woody regeneration age classes

Vegetation

APPENDIX E -- Digital Data Entry

Worksheets contain vegetation codes for grasses (including grasslikes), shrubs, trees, and forbs

Key species are listed in a column on the right side of the DMA spreadsheet.

Comments

Comments may be general or by plot.

Statistics

The "Stats" worksheet describes statistics used to calculate sample size

Using the Data Analysis Module

The Macros in this Module open your Data Entry file and extract data for analysis

Macro's must be enabled to function. Enable Macros in "Tools", "Macro", "Security"

The Data Analysis Module and your file containing the data that you want to transfer to the Data Analysis Module must be in the same folder on the PC.

To begin, open EXCEL as a blank workbook, and then select "File", "Open", and then navigate to the Data Analysis Module

Use Ctrl "d" to get data from the DMA in your Data Entry file

In this Macro, you supply the name of the Data Entry file WITHOUT the 'xls' extension.
Make sure that the Data Analysis file and your Data Entry file reside in the same Folder.
This Macro will stop after 1 DMA has been imported into the Data Analysis Module.
The "Data Summary" worksheet can then be opened to examine results.

Each iteration of data import into the Data Analysis Module provides an opportunity to save the raw data and data summary

A good convention is to save the file as follows: "allotment_DMAname" (e.g. for the Dry Creek Allotment, Long Creek DMA: "drycreek_longcreek")

Once the file has been saved, close it, then reopen the Data Analysis Module

Always keep the master copy of the Data Analysis Module in a separate folder

Make copies of the Module and place them in each data file folder.

APPENDIX E -- Digital Data Entry

Use these copies to run the Macros and analyze the data - never use the master copy.

Your field-entered vegetation codes must match those in the "Codes" worksheet. If they don't, you will need to replace the field-entered codes with those in this worksheet to run the analysis.

APPENDIX F- Riparian Monitoring Data Sheet Instructions

RD/FO:			Forest/District:		Date:
Alloment Name:			Stream Name:		
Pasture Name:			Designated Monitoring Area (DMA) No.:		
UTM N:		UTM E:	Observer(s):		
Step Interval:		Step Length:			

Plot No.	Greenline Vegetation		Streambanks		Stubble Height		Woody Species Regeneration						GGW	Woody Use	
	Dom	Sub	Altered (0 to 5)	Stability Class	Specie	Height	Specie	Seeding	Young	Mature	Dead	Unclassified		Species	Use (Mid-Point)

APPENDIX F- Riparian Monitoring Data Sheet Instructions

Plot No.—Enter the plot no. for each plot. Leave blank if additional lines are needed for entering data. For example, a plot contains two or more species are encountered in the woody species regeneration, enter the species name on the next line.

Riparian Vegetation

Dominant—enter the species code for the dominant vegetation. If any part of the quadrat contains a woody species overstory, enter that plant code in the first line of the plot. If there is a co-dominant species enter it on the next line without a plot number. The first species code of riparian community type may be entered into this column. The second species code in the riparian plant community designation may be entered into the Subdominant Vegetation column.

Subdominant—enter the species code of the species into this column. If there are two subdominant plant species, enter the code on the next line without a plot number.

Streambank

Altered—record the number of lines (0 to 5) that intersect streambank disturbance caused by the hooves of livestock and/or wildlife. If more than one animal track is intersected along one of the five lines, only one is recorded.

Stability Class—Record the streambank stability class (cs-covered/stable, cu-covered/unstable, uu-uncovered/unstable, us-uncovered stable, fs-false bank, or un-unclassified.

Stubble Height

Key Species—enter the code of the key species.

Average Height—record the average height of the leaves of the key riparian species nearest the handle and within the plot. When there are no key species in the quadrat, leave the cell blank.

Woody Species Regeneration

Species—Enter the code for the woody species encountered within the plot.

Seedling—Record the number of individual woody plants classified as seedlings. Leave blank if not seedlings are counted.

Young—Record the number of individual woody plants classified as young. Leave blank if not seedlings are counted.

Mature—Record the number of individual woody plants classified as mature. Leave blank if not seedlings are counted.

Decadent—Record the number of individual woody plants classified as decadent (over 50 percent of the plant is dead. Leave blank if not seedlings are counted.

Dead—Record the number of individual woody plants classified is dead (no part of the plant is alive). Leave blank if not seedlings are counted.

APPENDIX F- Riparian Monitoring Data Sheet Instructions

Unclassified—Use this column for recording the number of woody species stems within the plot that is not classified by age. It may be used for rhizomatous species such as coyote willow (*Salix exigua*).

Greenline-to-Greenline Width (GGW)

Record the non-vegetated distance (meter or English) at each plot location. The measurement is from the greenline at the back of the quadrat across the stream, perpendicular to the water flow direction, to the greenline. When a vegetated island is encountered, subtract the distance of vegetated island from the total greenline-to-greenline distance.

Woody Use

Species—record the code of the woody specie on which use will be determined.

Percent Use—enter the mid point number (none to slight = 5; slight to moderate = 25; moderate = 50; heavy to severe = 75; and extreme = 95) of the use class for each transect.